AMATEUR SATELLITE REPORT

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Editor: Vern Riportella, WA2LQQ
Managing Editor: Bob Myers, W1XT

AMSAT® NA *Newsletter for the Amateur Radio Space Program*

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Conferees Agree In Principle To Deploy PACSAT From Mir

AMSAT NA leaders met with United Nations and Soviet Space Research Institute representatives recently near Geneva, Switzerland. Progress was made towards realizing launches of various packet radio satellites initially from the Mir space station. Others could possibly follow from other Soviet launchers. This could lead to a cooperative program of satellite construction and launch as has occasionally been done for various scientific packages. Although many details remain to be addressed and serious impediments still exist, all sides expressed cautious optimism that the objectives could be obtained.

The initial objective is to launch a small packet radio store-and-forward satellite for the SatelLife group based in Boston within 18 months. Tentatively dubbed HEALTHSAT-1, the satellite would provide prototype electronic mail service for physicians working in remote areas where communications are difficult or non-existent.

HEALTHSAT-1 would operate near but not on Amateur frequencies if licensing on space research frequencies can be coordinated with international authorities. In the event coordination is impossible, the satellite will be licensed under Amateur rules and operate on Amateur frequencies. In this case the spacecraft would revert to one of the OSCAR series and be used by the general Amateur Radio Satellite community. Under this scenario, it could be used by SatelLife for limited scope "proof-of-concept" limited duration experiments by licensed Amateurs as has been customary in the past. Meanwhile, it would of course be available for normal Amateur satellite QSOs by all licensed Amateurs. The primary approach will be, however, to license the satellite under non-Amateur space research frequencies near the 2 meter and 70 cm Amateur bands.

The satellite would be manually deployed from Mir. First it would be transported to Mir-rendezvous by a Progress cargo rocket. Then it would be manually deployed by a Cosmonaut into orbit. Because of the low orbit of Mir, the orbit of HEALTHSAT-1 will soon decay. An orbital lifetime of one year is nominally expected. However, if solar activity picks up significantly, the orbital lifetime could be truncated to 6 months or so.

Mode J-type operation is envisioned for HEALTHSAT-1. The satellite will be optimized for use by very low performance ground stations. Attache case-sized portable units will be the benchmark. A lap top computer, micro TNC, a 2 meter and a 70 cm HT plus a small turnstile antenna for 2 meters and a 5/8 vertical for 70 cm will be all that's required to link up at up to 4800 bps. This all will fit into the typical attache case for ease of transport and establishment.

Representatives of the Soviet Academy of Sciences Space Research Institute delegation attended the meeting. Representatives of the United Nations included five individuals from the World Health Organization based in Geneva. The Deputy Secretary-General of the International Telecommunications Union was on hand as was the Under Secretary General of the League of Red Cross and Red Crescent Societies from Geneva. A senior UNESCO representative also attended. Attending the meeting for AMSAT NA were its Chairman and Chief Engineer Jan King, W3GEY, and its President Vern Riportella, WA2LQQ. The meeting was held March 19 through 21 in Annecy, France, 50 km south of Geneva.

The attendees learned of the technical aspects of the first HEALTHSAT satellite from AMSAT. Then they witnessed a simulated PACSAT demonstration using two complete earth terminals to transfer files as would be done on HEALTHSAT. The terminals consisted of Tandy Model 1400 LT laptop computers on loan from Tandy, Forth Worth. The radios were Yaesu model FT-73 70 cm HTs on loan from Yaesu through the courtesy of Mike Henderson, N6JFD, of Yaesu. The micro-TNCs were supplied by

Attending a meeting in Annecy, France March 19-21 were representatives of AMSAT NA, and agencies of the U.N. including W.H.O., UNESCO, and ITU. Representatives of the Space Research Institute (IKI) of the USSR, also in photo, have agreed in principle to launch a satellite built by AMSAT for SatelLife from the Mir space station. AMSAT's President WA2LQQ and Chairman W3GEY are seen 4th and 7th from left.

TASCO through the kindness of JAMSAT officials in Japan. Ralph Wallio, WØRPK, lead a small team in the demo system test and integration in Iowa prior to the meeting. The attendees seemed very impressed by the errorless transmission and the evident portability of the terminals.

A mid-1989 launch for HEALTHSAT-1 is planned subject to a more closely defined schedule. Launches of Amateur radio satellites aboard various Soviet launchers is a definite possibility AMSAT NA officials suggested. And, in a spirit of mutuality and balance, Russian-developed and built satellites might be launched in the U.S. they said.

Phase 3C Launch Team Arrives In Kourou

Teams from AMSAT NA and AMSAT DL arrived in Kourou, French Guiana March 29 to begin final preparations for the launch of Phase 3C now expected in less than six weeks.

The AMSAT NA team under Jan King, W3GEY, and the DL team under Karl Meinzer, DJ4ZC, began work upon arrival at the European Space Agency facility in Kourou which is located on the north east coast of South America. Initial tasks the team is to perform include uncrating the spacecraft and support equipment. They will then apply thermal coatings and other materials needed for flight. The first team's tasks will require about two weeks to accomplish.

A second team will deploy for Kourou around mid-April for the critical spacecraft fueling operation. The AZ50 and nitrogen tetroxide fluids are hazardous and must be handled very carefully.

Beginning in early May, a third team will deploy to Kourou for final preparations and spacecraft monitoring. The launch is currently slated for early June. The exact launch date depends on the results of the V-22 launch scheduled for May 11.

Revised Phase 3C Frequency Table Issued

As anticipated, a revised table of Phase 3C operating frequencies has been issued. These update the preliminary values issued in February and represent a close approximation of the expected on-orbit operating frequencies. The complete list will be published in *ASR* together with conversion tables when space allows. However, here is a summary of the new values:

Mode B:	Uplink:	435.420 - 435.570 MHz
	Downlink:	145.975 - 145.825 MHz
	GB:	145.812 MHz
	EB:	145.985 MHz
Mode JL:	L Uplink:	1269.620 - 1269.330 MHz
	J Uplink:	144.425 - 144.475 MHz
	RUDAK up:	1269.710 MHz
	L Downlink:	435.715 - 436.005 MHz
	J Downlink:	435.990 - 435.940 MHz
	RUDAK down:	435.677 MHz
	GB:	435.651 MHz
Mode S:	Uplink:	435.601 - 435.637 MHz
	Downlink:	2400.711 - 2400.747 MHz
	Beacon:	2400.325 MHz

Individuals writing articles on Phase 3C will want to request the new Phase 3C launch information specifications which include the revised frequencies and updated launcher specifications. Send an SASE to WA2LQQ, P.O. Box 177, Warwick, NY 10990. Others not writing articles but interested in obtaining the launch information kit may obtain it from AMSAT HQ for a small donation. Press kit photos are also available for a modest donation. Contact AMSAT HQ for details.

Skitrek Progress Report #9: March 26

The Amateur Radio supported Transpolar Skitrek Expedition made excellent progress across the frozen Arctic Ocean in the early part of the past week. Calm days made the -35 degree Celsius temperatures bearable as the skiers trekking averaged more than 20 km per day. Ice conditions were excellent with few hummocks, cracks in the ice or leads of open water. The skiers are in excellent spirits and have developed into a closely knit team, despite cultural differences.

The Arctic is full of surprises, however, and the "moving group" (a term expedition communicators use to refer to the skiers) found the going very difficult as the week progressed. High winds and blowing snow prevented the skiers from pressing on. The Transpolar Drift Stream, a major Arctic Ocean current, carried them westward slightly as well. Expedition Leader Dimitri Shparo also experienced a minor injury to his ankle. None of these factors are affecting the determination or ability of the skiers to continue to the Pole and Canada beyond. With almost 400 kilometers behind them, the skiers look forward to calm days and warmer weather.

On Saturday the 26th the skiers travelled a good distance and Sunday the 27th, they covered 31 km, their best progress to date. Monday brought disappointment as they ran into a wide lead of open water and had to travel some distance east to cross it. Shortly thereafter, they ran into another wide lead, travelled east again, saw no end to it and travelled back to their starting point and set up camp in hope the lead would close overnight. Today they received their second air drop of supplies and equipment. They will remain camped for several days of R & R and scientific experiments. Check the Digitalker on UO-11 for the position of the drop camp.

The Digitalker on UO-11 has been marking the progress of the skiers with improved enunciation and up-to-date reports. SARSAT/COSPAS operations via the ELT the skiers are carrying and the hybrid link to the University of Surrey have been functioning as intended. Educators and hams have been testing antenna systems for UO-11 reception and have found the HT with whip antenna desirable for portable reception and the turnstile with reflector or TR antenna desirable for fixed operation. The TR antenna is described in the "Satellite Experimenters Handbook" by Dr. Martin Davidoff, available from AMSAT HQ.

Many of the elementary and secondary schools following the trek are contacting each other and comparing trek watching activities. This sharing is being coordinated by AMSAT's Science Education Advisor Rich Ensign, N8IWJ. If you want a school you are helping to become a part of the sharing, contact Rich for a list of schools involved. His address is 421 N. Military, Dearborn, MI 48124.

Skitrek Progress Report #10: April 2

The Amateur Radio supported Transpolar Skitrek Expedition is now half-way to the North Pole. The thirteen skiers have completed more than a quarter of their 1730 km trek from Russia to Canada. After a three day break for supply air drop #2, they began moving again on Friday, April 1st. All skiers are in good health and good spirits. Leads of open water have often frustrated them but "time heals all wounds in both people and ice" and the leads close allowing further progress. Those plotting the skiers' progress may have noticed their drift westward in the last week. This is due to the Transpolar Drift Stream Current, a major force moving Arctic water and ice.

Canadian Communications Support Team members at Resolute Bay are enjoying their two week stints in the north country. They have become regular fixtures in this outpost community. Gary Hammond, VE3XN, will be taking his turn at Resolute this week.

Gary is Head of the Geography Department at Listowel Secondary School in Listowel, Ontario. Rick Burke, VO1SA, Portable UAØ, is returning to Canada shortly after representing the Canadian Communications Team at Sredniy Island in the Soviet Arctic. Now that the skiers are closing in on the Pole, the Russian Ice Island North Pole 28 will become the focus of support communications operations. Barry Garratt, VE3CDX, Portable 4KØ, is journeying to the ice island to join his Russian counterparts Peter and Pavel. General call for the ice island is 4KØD.

Rich Ensign, N8IWJ, AMSAT Science Education Advisor, would like to remind those working with schools to advise him of their activities concerning the trek. Good photos of student involvement are especially welcome and may be used in future *Amateur Satellite Report* issues. Contact Rich at: 421 N. Military, Dearborn, Michigan 48124.

Ralph Wallio, WØRPK, AMSAT VP for Operations, reports that high interest has been generated at the Des Moines Iowa Science Museum by a display featuring Amateur Radio's involvement in the Skitrek. The display, located at the museum's entrance, includes a map showing the trek's progress, a radio monitoring UO-11, and a real-time tracking map display of UO-11's ground track. Bob Goodman, K8VHM, reports that the Alliance Ohio Amateur Radio Club recently featured the Skitrek in a display at a local mall. Visitors to the display monitored UO-11's Digitalker Reports and heard explanations of the trek and Amateur Radio's role in it from local hams.

Rich advises there is a labeling error on page 11 of the Skitrek Teachers Guide. Under the Eastern Time Zone conversion chart the first column should be labeled EDT the second column EST and the third UTC. With this change, all numbers in the columns are correct.

In our next report, we'll look more closely at Canadian Support Communications Operations and visit the elaborate display featuring the Transpolar Skitrek Expedition at the Ontario Science Center.

This report is prepared by Rich Ensign, N8IWJ, AMSAT Science Education Advisor for use with The AMSAT Teachers Guide "Exploring The High Arctic From Your Classroom" A continuing series of Progress Reports like this one may be accessed via packet BBS, AMSAT Nets and the main educator source, the WØRPK AMSAT Bulletin Board. (1-515-961-3325)

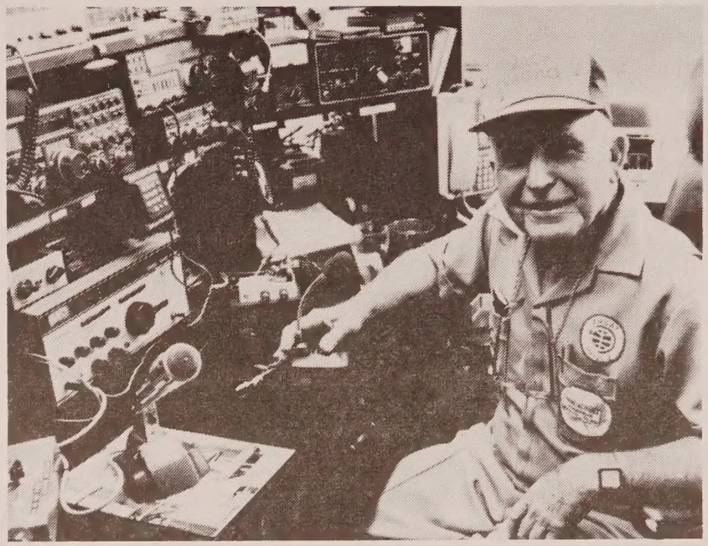
Skitrek Communications Working Well

Packet radio is running full tilt from the northern frontier thanks to the help of Advanced Electronic Application's President Mike Lamb, N7ML. AEA has provided its highly-rated PK-232 digital communications units for the SKITREK team to use. The University of Surrey in England reports regular communiques from Sredniy Island on 20 meter packet. The bulletins from there have been relayed by the UO-11 satellite. Operator EXØCR (also known as UA3CR) has been using the PK-232 to communicate with the outside world on packet.

Meanwhile, the radios supplied by ICOM are functioning well despite the bitter cold temperatures experienced by the moving team which have approached -40 degrees Celsius. The micro-2AT 2 meter HTs the moving team has been using to monitor the UO-11 Digitalker downlink have provided daily navigation updates to the team. The micro-2AT units are equipped with the AEA Hot Rod high gain vertical antenna to provide the best possible reception for the trekkers. The ICOM HF station donated to the Canadian radio support team by ICOM's marketing manager Evelyn Garrison, KA7LPK, has been logging tens of thousands of QSOs reports from the arctic indicate. Daily nets have been held on 14.125 MHz from several of the arctic bases.

AEA and ICOM have been in the forefront in supporting SKITREK. AMSAT, CRRL and the Amateur Radio community is grateful and expresses it thanks.

Short Bursts



Mack Jordan, W4DAQ, in his shack a few years ago.

• Mack Jordan, W4DAQ, of Demopolis, Alabama, is recovering after surgery. Mack, who is an AMSAT Regional Coordinator, was operated on for an arterial embolism recently and is now convalescing at home. Greetings to this AMSAT stalwart are certainly in order.

• Most of the U.S. went to Daylight Time early Sunday, April 3. Following precedents, all AMSAT regional nets such as the 75 meter Tuesday nets will remain at the same local time. However, international service nets will maintain the same UTC time. This means that the 20 meter international net will be heard one hour later in the U.S., local time.

• The AMSAT Launch Information Network Service (ALINS) will carry pre-launch, launch day and post-launch activities surrounding the Phase 3C launch beginning in late May. Stations around the world including W1AW and club stations at various NASA facilities are expected to be part of the radio network. The ALINS is being organized by Operations VP Ralph Wallio, WØRPK. Watch for announcements regarding time and frequencies. Individuals interested in obtaining a network feed should contact WØRPK ASAP.

• On Saturday, March 26, Southern Africa AMSAT launched its 25th BACAR (Balloon Carrying Amateur Radio.) The equipment flown included a 2 meter recovery beacon operating on 144.550 MHz at altitudes below 28,000 feet. The power is alternated between 1 and 350 mW every 30 seconds. This beacon is used to DF the package on its descent. A voice store and forward repeater is the main attraction of this flight. It accepts 15 seconds of audio and repeats it using a digitized record of the uplink. The repeater will accept packet and voice. The balloon is expected to reach a maximum altitude of 70,000 feet above sea level. Late reports indicate the sturdy balloon failed to explode as planned and drifted over the border to Botswana. The payload may still be recovered according to SA AMSAT President Hans Van de Groenendaal, ZS6AKV.

Phase 3C Insurance Campaign Donors List

AMSAT is deeply grateful for the donations which to date have amounted to nearly $8,000 towards insuring the Phase 3C spacecraft.

We are especially grateful to the members of AMSAT UK and SA AMSAT for their donations of $1,000 each! Also, our heartfelt thanks to the members of AMSAT-SM for the donation of $200.

Other donors included: Donald King, $26; Ralph Parschen, $30; Dick Cotton, W8DX, $100; Robert McGwier, N4HY, $100; John Bowman, $26; N. Steven Hubbard, $10; Jack Butler, $5; Edwin Price, $100; William O'Neil, $10; W. Vern Hajek, $30; Eugene Pentecost, KG6EX, $50; John Wisniowski, $20; James Maynard, $30; Merrill Stiles, W7HT, $10; Bradford Rice, $10; Chuck Hilliker, W7KIV, $30; Albert Patrick, $30; Nathan Janco, W5FUR, $20; Bob Rogers, W8JLE, $200; Ray Burns,

W4TZG, $25; Jim Walsh, W7LVN, $50; Birger Lindholm, $180; John Hogan, KC7GY, $30; Dieter Schliemann, KX4Y, $10; Wendell Jackson, $25 Kenneth Chaffee, WA1QXR, $30 Jim Caddell, N9FGH, $10; George Chambers, KØBEJ, $30; Bob Halley, K8YMI, $30; Guy Geils, $15; Robert Lingelback, KB6CUN, $30; Thomas Clements, $300; Russ Ward, $10; Craig Wasson, N6IO, $25; Joel Harrison, $50; Dwight Dopilka, N2ALA, $30; Frank Richelme, VK7ZFM, $20; H.G. Wightman, VE5XU, $30; Bill Overman, K4SNF, $30; Cesar Daglio, LU8EBH, $10; Steve Lund, WA8LLY, $10; Robert Douglas, W5GEL, $30; Truro A.R.C., $10; Kenji Arai, JR1WZI, $100; Norbert Notthoff, DF5DP, $50; Joseph Jolda, $10; Robert Briggs, $100; John Conner, $20; John Meyers, $30; Joseph Torok, $30; Wray Dudley, W8GQW, $10.50; D.H. Lamont, ZL2AMD, $15; West Allis Radio Amateur Club, $100; Buford Smith, W4FCJ, $30; John/Jack Riley, KZ1U, $30 N.D. Williams, ZL3TQZ, $30 Karl Protze, DL7KK, $10; Max Bodenhausen, WØZZQ, $20; John Molnar, WA3ETD, $100; Francis Hojlo, N1EGG, $30; Lee Amoroso, $10; Harold Lynch, KAØFQR, $50; Junior de Castro, PY2BJO, $847; Anonymous, $25; Robert King, W3GH, $30; James Paquin, K6ML, $30; Arnold Seamans, KJ1X, $30; Michael Schaffer, KA3JAW, $30; Phil Gray, $12; Rejean St. Jean, VE2FBR, $30 Ron Johnson, WA5RON, $10 Alexamder Kulchuk, W1PUV, $30; Peter Motyl, K1PXE, $30; Ron Long, W8GUS, $50; Howard Brown, $50; Robert Barbee, Jr., W4AMI, $100; Bill Tynan, W3XO, $100; Douglas Nordman, $10; Jim Young, VE7AZO, $41; Jack J. de Jonge, $30; Regis Briney, $50; Lyle Mabbott, $100; Bruce Rahn, WB9ANQ, $26; John Reeves, WB4QWE, $26; E.D. Brown, W5FYZ, $16; Michael Parker, KT7D, $250; George Lehmkuhl WØNFW, $30; Ted Mathewson, W4FJ, $100; Tex Wayne Leggett, WB5IQK, $30; Keith Pugh, W5IU, $100; Michael Hatten, KB8CJA, $10; John Molnar, WA3ETD, $100; Tony Bartel, VK3ZOT, $30; Oscar Pelizzoli, I2PZB, $100; Jerry Stover, W5AE, $50; David Daley, NU9H, $5; E Honingh, $10; R.E. Janssen, $50; Daniel Weisser, NK7M, $20; Edward Rojowski, N8GZL, $26; Robert Evans, $30 John Holden, $50; Gunter Neugebauer, VE7CLD, $100; D.A. van de Poel, $40; Ronald Maille, KB1KO, $10; Robert Ashley, KD7B, $10; Andy MacAllister, WA5ZIB, $30; Quintin Ussery, W5LDO, $12; Kenneth Leiner, $10; Scott McClelland, $55; Charles Parmelee, W9ODI, $30; William Sell, $25 Frank Guyer, $30; W.E. Cruse, $50; Carl Hundstad, $30; Robert Ingersoll, $50; Charles Willett, $10; Lester Peterson, W9YCV, $10; KO Learner, K9PVW, $30; Bob Lahde, NA6E, $20; William Burden, $15; Charles Hall, $10; R.L. Tester, $25; Paul Darwactor, $10; Dick Campbell, N3FKV, $20; Emmett Burke, $10.

AMSAT To Team With Technology Center

AMSAT has agreed in principle to join with Weber State College in Ogden, Utah in the design and construction of a broad range of satellite and space related projects. Weber officials met with their AMSAT counterparts at AMSAT's new Boulder, Colorado facility to be briefed on possible areas of joint effort. The meeting March 25 and 26 followed preliminary meetings at Weber State earlier in the month.

The Center for AeroSpace Technology (CAST) at Weber State is headed by Robert J. Twigg. Weber State has previously built and launched a small satellite under Mr. Twigg. The shuttle launched Getaway Special (GAS can) was called NUSAT for Northern Utah Satellite. NUSAT-1 was a radar calibration satellite operated by students at Weber State and launched in 1985. To date, NUSAT-1 has been the only payload to be ejected from a GAS can to obtain an orbit apart from the shuttle's. NUSAT-II is now under construction.

The cooperative effort between AMSAT and CAST will likely bridge many areas of technology and span several classes of spacecraft although specific agreements remain to be specified. CAST has resources including CAD/CAM, mechanical testing, fabrication, simulation and more. AMSAT programs now under way include small packet radio satellites, Phase 3 class satellites and Phase 4 geosynchronous satellites. In addition, intense effort is now under way in the Digital Signal Processing area for both space and earth segment applications.

The relationship between AMSAT and CAST could be a favorable one for both groups. With a unique position in small satellites, AMSAT can help develop expertise at CAST. Meanwhile, CAST has a notable student and faculty resource to commit to projects of mutual interest as well as a fine plant facility and equipment to implement these projects.

AMSAT welcomes the new relation with CAST and Weber State College in general and looks forward to defining specific programs and then cooperating in these programs in the years to come.

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The Radio Amateur Satellite Corporation

Post Office Box 27
Washington, DC 20044
(301) 589-6062

Attendees at the Annecy, France meeting saw a packet radio demo based on the equipment seen here. (L to R): 2m HT, Yaesu FT-73R 70 cm HT, TNC-μ21, (available from Heathkit); Tandy 1400 LT laptop computer. The equipment was configured to simulate an optimized PACSAT earth terminal operating Mode J. The actual earth terminal planned for SatelLife's PACSAT, to be launched from Mir, will require a 10 watt 2m amplifier and slightly improved antennas, i.e., 2m turnstile and 70 cm co-linear vertical. AMSAT is grateful to Tandy, Yaesu and JAMSAT for loan of the demo equipment.

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